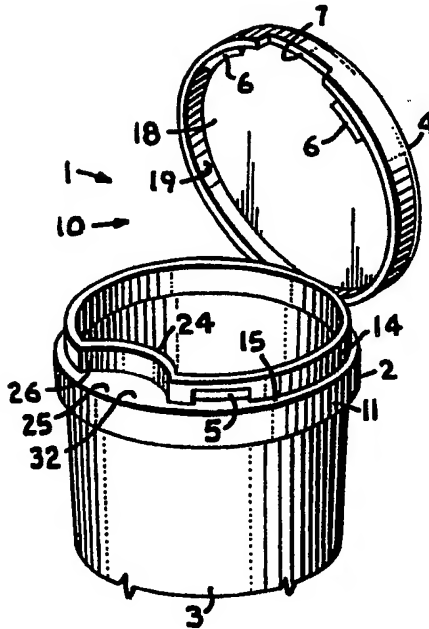


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(54) Title: CAPTIVE KEY RELEASE CLOSURE STRUCTURE (57) Abstract <p>A captive key release closure structure (1) includes a base ring (2) for connection to a rim (12) of a container (3), a closure member or cap (4) integrally hinged to the base ring (2), latch indentations (5) on an outer surface (29) of a neck wall (14) of the base ring (2), and latch pawls (6) on an inner surface (30) of a depending circumferential wall (19) of the cap (4) and aligned with the indentations (5). A key slot (7) is formed in the cap wall (19) at a position opposite the hinge (22), and a key receiving recess (26) is formed in the base ring (2). The latch indentations (5) and pawls (6) are positioned in sets on opposite sides of the key slot (7) and key recess (26). The closure structure (1) is open by insertion of a small keylike tool, such as a coin, spoon, or the like, and twisting against the surfaces forming the key slot (7) and recess (26) to separate and thereby release the pawls (6) from the indentations (5).</p> 		

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CAPTIVE KEY RELEASE CLOSURE STRUCTURE

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Field of the Invention

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Background of the Invention

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The present invention relates to closure devices for containers and, more particularly, to a hinged closure including a hidden latch which is released by twisting a key like device in a key slot of the closure.

Many types of containers and closure devices therefor have been developed in an effort to prevent poisoning of and injuries to young children by the ingestion of hazardous contents of such containers or contact therewith. This has been particularly true with regard to prescription and over the counter drugs. The same principles are also desirable for containers of household chemicals such as detergents and other cleaners, solvents, paints, fuels and automotive types of fluids, lawn and garden chemicals, and the like. In general, the approach is to make a container difficult to open intuitively, but to provide printed instructions for opening the container which can be followed by someone mature enough to read and understand the opening instructions, as well as any warnings provided on the label.

Another goal of the container and packaging industries is to provide containers which will readily show evidence of prior tampering to a purchaser of products contained therein. The principal concern is safety, to prevent the

1 contamination of ingestible products with harmful foreign
2 materials. Another concern involved with tamper evident
3 packaging is to inhibit in-store pilferage of packaged
4 materials and to maintain customer good will by providing
5 the full quantity of a product as listed on the package or
6 container.

7 Most aerosol products involve some sort of hazard. The
8 propellants for a considerable percentage of aerosol
9 products are flammable, and most can be asphixiating in high
10 concentrations in closed areas. Many products in aerosol
11 form can be injurious, such as paints, cleaners of various
12 types, insecticides, etc., by contact with the skin or eyes
13 or if inhaled. To avoid these hazards and others, it is
14 generally recommended that small children be prevented from
15 handling and using aerosol containers. Child resistant caps
16 to cover spray actuators of aerosol containers have been
17 developed to inhibit operation of aerosol spray actuators.
18 In one such type of child resistant aerosol cap, designated
19 sides of the cap must be squeezed to distort an inner wall
20 having a partial bead engaging a neck of the aerosol can to
21 release the bead so that the cap can be twisted loose. In
22 another type, a tool such as a screwdriver must be inserted
23 through an aperture through an outer wall of the cap to
24 release it.

25 One problem with most types of child resistant caps for
26 aerosol containers is that once the cap is removed, it may
27 be easily lost or discarded since it is not attached to the
28 container. Once the cap is lost, the container is no longer
29 child resistant and may thereafter be abused by a curious
30 child, not aware of the possible dangers involved. Another

1 problem with many conventional types of aerosol containers
2 is that in a store, the product may be released by an
3 irresponsible person, recapped, and replaced on the shelf
4 and thereafter purchased by a customer not suspecting that
5 the full quantity of product is not present.

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Summary of the Invention

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9 The present invention provides a child resistant
10 closure structure which is difficult to open by a young
11 child with limited manual dexterity, but which can be opened
12 using a simple tool by a more mature person. In general,
13 the closure structure of the present invention is a captive,
14 key release closure structure. The structure includes a
15 base ring for affixing to a container, such as a medicine
16 bottle, aerosol can, or the like, a closure member or cap
17 integrally hinged to the base ring, a latch mechanism to
18 retain the cap in the closed position, and a key slot
19 between the base ring and cap which is sized to receive a
20 simple tool, such as a coin, spoon, screwdriver, or the like
21 which can be twisted to pryingly release the latch
22 mechanism. The integral hinge arrangement, or captive
23 nature of the cap, maintains the child resistant quality of
24 the closure structure since the cap is not free to be
25 misplaced once opened.

26 The present invention includes a low profile embodiment
27 which is particularly adapted for containers such as small
28 medicine bottles as are used for both prescription and some
29 over the counter pharmaceuticals. The cap of the low
30 profile closure is sized in diameter and height to just fit

1 over a neck wall of the base ring of the structure. The key
2 slot may be formed in either a depending wall of the cap or
3 may be formed into the base ring and is positioned
4 diametrically opposite the hinge. A preferred latch
5 arrangement for the low profile closure includes a pair of
6 indentations formed on an outside surface of the neck wall
7 of the base ring on opposite sides of the position of the
8 key slot and pawl wedges formed on an inner surface of the
9 depending wall of the cap and positioned to align with the
10 indentations. Alternatively, the indentations could be
11 formed on the cap wall, and the pawl wedges could be formed
12 on the neck wall of the base ring.

13 An alternative embodiment of the latch mechanism for
14 the low profile key release closure structure is implemented
15 by a so-called reverse draft relationship between the neck
16 wall of the base ring and the depending wall of the cap.
17 The outer surface of the neck wall has a frustoconical shape
18 diverging upwardly. The inner surface of the cap wall is
19 provided with a complementary frustoconical shape which
20 converges downwardly. A key slot is formed between the cap
21 and the base ring at a position opposite the hinge.

22 A closure structure incorporating either the pawl and
23 indentation latch mechanism or the reverse draft latch
24 mechanism is formed of a somewhat resilient plastic with
25 enough resilience to allow the latch members to release when
26 a key is twisted in the key slot. The degree of difficulty
27 in opening such a structure can be controlled during
28 manufacture by varying the thickness of the depending wall
29 of the cap, the material employed, and the interengaging
30 depth of the members of the particular latch mechanism.

1 The present invention also provides a high profile
2 embodiment of the captive key release closure structure
3 which is particularly adapted for aerosol containers. The
4 high profile closure structure generally includes a base
5 ring for assembly onto a neck rim of an aerosol can, a
6 closure member or cap connected to the base ring by an
7 integral hinge, a key release latch arrangement formed as
8 cooperating components on the base ring and the cap, and a
9 key slot formed between the cap and base to receive a key
10 release tool. The base ring includes a top wall with an
11 opening therethrough to accommodate the spray actuator of
12 the aerosol can and a depending side wall having an inner
13 ridge which snaps over the neck rim of the aerosol can.

14 A latch pawl projects upwardly from the top wall of the
15 base ring opposite the hinge. A catch wedge is formed on an
16 inner surface of the side wall opposite the hinge for
17 engagement with the latch pawl on the base ring when the cap
18 is closed. The latch pawl and catch wedge are, thus, hidden
19 within the closure structure when the cap is closed. The
20 latch arrangement is released to open the cap by inserting a
21 simple tool into the key slot and twisting to snap the latch
22 components past one another. The cap may then be pivoted
23 about the hinge to an open position.

24 The high profile embodiment of the closure structure
25 may be provided with various types of tamper evident
26 features to indicate to a purchaser of a container
27 incorporating the structure that the container has been
28 previously tampered with. For use with aerosol containers
29 having their own aerosol spray actuators, an actuator cover
30 may be connected to the base ring by integrally molded and

1 frangible tamper bars. The cover must be removed by
2 breaking the tamper bars for access to the spray actuator.
3 Alternatively, an integral spray actuator may be molded onto
4 the base ring and connected by similarly frangible tamper
5 bars. In this form, the tamper bars must be broken loose
6 for use of the spray actuator.

7 The closure structure of the present invention is
8 adapted for assembly with aerosol containers using automatic
9 capping machines. To avoid undesired breakage of the tamper
10 bars, the caps are provided with separation prevention pins
11 or pegs positioned on the undersides of the end walls of the
12 caps. The separation prevention pin engages the integral
13 spray actuator cover or the integral spray actuator in the
14 closed position of the associated caps to prevent the tamper
15 evident features from being accidentally separated.

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17 Objects of the Invention

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19 The principal objects of the present invention are: to
20 provide an improved child resistant closure structure for
21 containers; to provide such a structure which can be
22 conveniently opened by mature persons, including adults with
23 impaired dexterity; to provide such a structure
24 incorporating a captive or hinged cap which is pivotal
25 relative to a base of the structure which is connected to a
26 container; to provide such a structure in which the cap is
27 retained in a closed position by a latch arrangement which
28 is released by twisting a key like object, such as a coin,
29 in a key slot to pryingly release the latch; to provide such
30 a structure in which the latch arrangement is hidden from

1 view in the closed position of the cap; to provide a low
2 profile embodiment of such a structure which is particularly
3 well adapted for use on small prescription drug type
4 containers; to provide a high profile embodiment of such a
5 structure which is particularly well adapted for use on a
6 conventional aerosol container or can without modifications
7 thereto; to provide such a high profile structure which
8 incorporates tamper evident features; to provide such a
9 structure which is adapted for assembly on an aerosol can
10 without damage to or separation of the tamper evident
11 features; to provide such a structure including an aerosol
12 spray actuator cover which is frangibly integral with the
13 base ring of the structure and a pin on an inner side of a
14 top wall of the cap which engages the cover in the closed
15 position of the cap to prevent separation of the cover when
16 the structure is assembled onto an aerosol can; to provide a
17 modified embodiment of such a structure including an aerosol
18 spray actuator which is frangibly integral with the base
19 ring along with a separation prevention pin on the cap; to
20 provide a variety of latch arrangements for such a key
21 release closure structure which are adaptable to various
22 sizes and types of containers; and to provide such a captive
23 key release closure structure which is economical to
24 manufacture, effective and convenient in use, and which is
25 particularly well adapted for its intended purpose.

26 Other objects and advantages of this invention will
27 become apparent from the following description taken in
28 conjunction with the accompanying drawings wherein are set
29 forth, by way of illustration and example, certain
30 embodiments of this invention.

1 The drawings constitute a part of this specification,
2 include exemplary embodiments of the present invention, and
3 illustrate various objects and features thereof.

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5 Brief Description of the Drawings

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7 Fig. 1 is a fragmentary perspective view of a low
8 profile embodiment of a captive key release closure
9 structure embodying the present invention.

10 Fig. 2 is an enlarged fragmentary front elevational
11 view of the low profile key release closure.

12 Fig. 3 is a top plan view of the low profile key
13 release closure, shown in an open orientation.

14 Fig. 4 is an enlarged fragmentary diametric sectional
15 view of the low profile key release closure, shown in the
16 open orientation.

17 Fig. 5 is a greatly enlarged fragmentary radial
18 sectional view of the low profile key release closure and
19 illustrates details of a latch mechanism thereof.

20 Fig. 6 is a fragmentary side elevational view of the
21 low profile key release closure with portions broken away to
22 illustrate details thereof.

23 Fig. 7 is a greatly enlarged fragmentary radial
24 sectional view of the low profile key release closure and
25 illustrates details of the key slot and key receiving recess
26 therebehind.

27 Fig. 8 is a fragmentary perspective view of a reverse
28 draft embodiment of the low profile key release closure
29 which incorporates a reverse draft latch arrangement.

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1 Fig. 9 is an enlarged fragmentary diametric sectional
2 view of the reverse draft key release closure.

3 Fig. 10 is a greatly enlarged fragmentary radial
4 sectional view of the reverse draft key release closure and
5 illustrates details of reverse draft latch arrangement.

6 Fig. 11 is a fragmentary perspective view of a high
7 profile embodiment of the key release closure of the present
8 invention employing a modified latch arrangement and shown
9 installed on an aerosol container.

10 Fig. 12 is a top plan view of the high profile key
11 release closure, shown in an open orientation.

12 Fig. 13 is a front elevational view of the high profile
13 key release closure.

14 Fig. 14 is a diametric sectional view of the high
15 profile key release closure taken on line 14-14 of Fig. 13
16 and illustrates details of cooperation between components of
17 the closure and an aerosol container.

18 Fig. 15 is a side elevational view of the high profile
19 key release closure, shown in an open orientation and with
20 portions broken away to illustrate details thereof.

21 Fig. 16 is a diametric sectional view of a second high
22 profile embodiment of the key release closure which is
23 provided with a frangibly integral aerosol spray actuator.

24 Fig. 17 is a side elevational view of the second high
25 profile key release closure, shown in an open orientation
26 and with portions broken away to illustrate details
27 thereof.

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1 Detailed Description of the Invention

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3 As required, detailed embodiments of the present
4 invention are disclosed herein; however, it is to be
5 understood that the disclosed embodiments are merely
6 exemplary of the invention, which may be embodied in various
7 forms. Therefore, specific structural and functional
8 details disclosed herein are not to be interpreted as
9 limiting, but merely as a basis for the claims and as a
10 representative basis for teaching one skilled in the art to
11 variously employ the present invention in virtually any
12 appropriately detailed structure.

13 Referring the drawings in more detail:

14 The reference numeral 1 generally designates a captive
15 key release closure structure embodying the present
16 invention. The structure 1 generally includes a base ring
17 or base 2 adapted to be attached to a container 3 and a
18 closure member or cap 4 hinged to the base 2 and sized and
19 positioned to close upon the base 2 to seal the container 3.
20 The structure 1 is provided with latch members 5 and 6
21 formed respectively on the base 2 and cap 4 which cooperate
22 to retain the cap 4 in a closed position on the base 2. The
23 structure 1 is also provided with a key slot 7 positioned
24 relative to the base 2 and cap 4 such that when the cap 4 is
25 in the closed position, it may be opened by twisting a
26 common tool, such as a coin, spoon, or the like, in the key
27 slot 7 to pry the latch members 5 and 6 apart to release
28 same and allow the cap 4 to be pivoted to an open position.
29 Figs. 1-7 illustrate a preferred low profile embodiment
30 10 of the captive key release closure structure 1. The base

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1 ring 2 includes a mounting collar 11 which is adapted to
2 snap over a rim 12 of the container 3. The container 3 may,
3 for example, be a vial or bottle of the type in which
4 prescription drugs are dispensed. A circumferential neck
5 wall 14 projects upwardly from the collar 11 and has a
6 diameter slightly less than that of the collar 11 to define
7 an upwardly facing shoulder 15 on top of the collar 11.

8 The cap 4 includes a circular end wall 18 having a
9 cylindrical wall 19 depending from a periphery thereof. The
10 wall 19 has a lower surface 20. The cap 4 is hingedly
11 connected to the base ring 2 by a hinge member 22 connected
12 between the collar 11 of the base ring 2 and the depending
13 wall 19 of the cap 4. Preferably, the base ring 2, cap 4,
14 and hinge member 22 are formed integrally, as of a somewhat
15 flexible and resilient plastic. The depending wall 19 has a
16 diameter slightly greater than that of the neck wall 14
17 whereby when the cap 4 is closed, the cap wall 19 fits
18 snugly about the neck wall 14 to seal the container 3 by
19 engagement of the surface 20 of the cap 4 with the shoulder
20 15 of the base 2. The surface 20 and shoulder 15 also form
21 an interface 33 between the cap 4 and base ring 2 when the
22 cap 4 is in the closed position.

23 A recess portion 24 of the neck wall 14 is curved
24 inwardly at a position opposite the hinge 22, and the
25 shoulder 15 is extended inwardly to form a recess base wall
26 25 connecting with the recess wall 24. The recess wall 24
27 and recess base wall 25 define a key receiving recess 26.
28 The key slot 7 is rectangular in shape, and in the
29 illustrated low profile structure 10, the key slot 7 is
30 formed in the depending wall 19 of the cap 4 at a position

1 opposite the hinge 22. The key receiving recess 26 aligns
2 with the key slot 7 when the cap 4 is in the closed position
3 and provides clearance behind the slot 7 to receive a key
4 like tool used to open the cap 4. The illustrated key slot
5 7 is sized to receive a key like tool, such as a U. S. five
6 cent coin or nickel. This size is appropriate for receiving
7 other common household items, such as a handle tip of a
8 spoon, a table knife, a screwdriver, or the like for use in
9 prying the cap 4 open.

10 A preferred embodiment of a key release latch mechanism
11 28 is illustrated in Figs. 1-7. In the latch mechanism 28,
12 a pair of latch indentations 5 are formed on an outer
13 surface 29 of the neck wall 14 on opposite sides of the
14 recess 26. A pair of latch pawl wedges 6 are formed on an
15 inner surface 30 of the depending cap wall 19 on opposite
16 sides of the key slot 7 and positioned to align with the
17 indentations 5. When the cap 4 is pivoted to the closed
18 position, as shown in Fig. 2, the pawl wedges 6 snap into
19 the indentations 5 to retain the cap 4 in the closed
20 position. In order to release the latch mechanism 28, a
21 keylike tool (not shown) is inserted into the recess 26
22 through the key slot 7 and twisted to engage a lower surface
23 31 of the key slot 7 and an upper surface 32 of the recess
24 base wall 25. Usually, such an action will release both
25 latches 28. However, it may be necessary under some
26 circumstances to twist the keylike tool first in one
27 direction and then the opposite direction to fully release
28 both latches 28.

29 While the illustrated low profile captive key release
30 closure structure 10 is illustrated as separate from the

1 container 3, it could also be formed integrally therewith.
2 And while the container 3 is illustrated as a cylindrical or
3 frustoconical medicine type vial, it could other types of
4 containers of different shapes, such as rectangular or the
5 like. Finally, while the key slot 7 is illustrated as being
6 formed in the wall 19 of the cap 4, it could be formed
7 entirely within the base ring 2 or have portions formed in
8 the cap wall 19 and the base ring 2.

9 Figs. 8-10 illustrate a modified embodiment 37 of the
10 low profile captive key release closure structure which
11 incorporates a so-called reverse draft type of latch
12 mechanism 38. The reverse draft closure structure 37 is
13 similar in most respects to the low profile key release
14 structure 10 except for aspects related to the latch
15 mechanism 38. The structure 37 includes a base ring 40
16 adapted to snap over the rim 41 of a container 42, such as a
17 medicine vial. The base ring 40 includes a circumferential
18 neck wall 43 which is inset radially from a mounting collar
19 44 of the base 40. A closure member or cap 45 includes an
20 end wall 46 with a depending cylindrical wall 47. The cap
21 45 is attached to the base ring 40 by a hinge member 48
22 which, preferably, is integral with the cap 45 and base ring
23 40.

24 A key slot 50 is formed in the base ring 40 at a
25 position opposite the hinge 48 and has a key receiving
26 recess 51 formed inwardly thereof. As is illustrated in
27 Fig. 8, there is no portion of a key slot formed in the cap
28 45. However, the key slot 50 could alternatively be formed
29 in the wall 47 of the cap 45 in combination with a recess 51
30 in the base ring 40, in the manner illustrated in Fig. 1 for

1 the closure structure 10. Similarly, the key slot 50 could
2 be divided between the base ring 40 and the cap 45. The key
3 slot 50 provides for opening the cap 45 from its closed
4 position upon the base ring 40 by the insertion of a keylike
5 tool into the slot 50 and twisting to separate portions of
6 the latch mechanism 38.

7 The latch mechanism 38 is referred to as a reverse
8 draft type of latch because the draft angles of an outer
9 surface 53 of the neck wall 43 and an inner surface 54 of
10 the depending wall 47 of the cap 45 is opposite to that
11 which would allow the cap 45 to be freely opened. The
12 surfaces 53 and 54 are complementarily frustoconical such
13 that when the cap 45 is closed upon the base ring 40, the
14 surface 54 of the cap wall 47 snaps past the surface 53 of
15 the neck wall 43 and, thus, retains the cap 45 in the closed
16 position. The surfaces 53 and 54 comprise components of the
17 latch mechanism 38. It is not essential that the conical
18 contours of the surfaces 53 and 54 extend completely about
19 the neck wall 43 and cap wall 47 respectively. However,
20 such complete encirclement of the contours 53 and 54
21 contributes to sealing of the container 42. The degree of
22 difficulty to opening the cap 45 can be controlled during
23 manufacture of the structure 37 by the choice of materials,
24 the wall thickness of the cap wall 47, and the conical
25 angles of the surfaces 53 and 54. In most other respects,
26 the closure structure 37 is substantially similar to the
27 structure 10.

28 Figs. 11-15 illustrate a high profile embodiment 60 of
29 the captive key release closure structure which is
30 particularly well adapted for capping containers such as

1 aerosol cans 61. The high profile structure 60 includes a
2 base ring 62 adapted for snapping over a neck rim 63 (Fig.
3 14) of the aerosol can 61, and a closure member or cap 64
4 connected by a preferably integral hinge 65 to the base ring
5 62. The cap 64 is retained in a closed position by a latch
6 mechanism 66 (Fig. 13).

7 The base ring 62 includes an upper wall 73 having a
8 circular opening or aperture 74 centered therethrough to
9 accommodate an aerosol spray actuator 75 of the aerosol can
10 61. A bead or low wall 76 extends about a periphery of the
11 base ring 62 except at a position opposite the hinge 65 to
12 prevent releasing the latch mechanism 66 by sliding the cap
13 64 laterally. The cap 64 includes an end wall 80 having a
14 cylindrical or somewhat conical side wall 81 depending
15 therefrom. The side wall 81 has a height sufficient to
16 accommodate the aerosol spray actuator 75. The hinge 65
17 connects between an edge of the upper wall 73 of the base
18 ring 62 and an edge of the side wall 81 of the cap 64. The
19 illustrated latch mechanism 66 includes a latch pawl 84
20 upstanding from the upper wall 73 of the base ring at a
21 position opposite the hinge 65 and a catch member 85 formed
22 on an inner surface of the cap wall 81 and positioned to
23 align with the pawl 84. When the cap 64 is pivoted to the
24 closed position, the catch 85 snaps past the pawl 84 to
25 retain the cap 64 in the closed position.

26 A key slot 88 is formed in the cap wall 81 at a
27 position opposite the hinge 65 and near the latch mechanism
28 66. The key slot 88 is sized to receive a keylike tool
29 which is inserted and twisted to pry apart and release the
30 catch 85 and pawl 84 to open the cap 64. Such a keylike

1 tool bears against the upper wall 73 of the base ring 62 in
2 the area to the pawl 84 and an upper surface 89 of the key
3 slot 88. The degree of difficulty in releasing the latch
4 mechanism 66 can be controlled during manufacture of the
5 structure 60 by varying the wall thickness of the side wall
6 81, the thickness of the pawl 84, the selection of materials
7 for their construction, and the biting depth of the pawl 84
8 and catch 85.

9 It should be noted that the key slot 88 could
10 alternatively be formed entirely as a recess into the base
11 ring 62, or portions of the key slot 88 could be in both the
12 base ring 62 and the cap wall 81. The high profile key
13 release closure structure 60 could alternatively be provided
14 with another type of latch mechanism, such as one similar to
15 the latch mechanism 28 of the structure 10 or the reverse
16 draft type of latch mechanism 38 of the structure 37.

17 The high profile key release closure structure 60 is
18 preferably provided with a tamper evident arrangement 92 to
19 alert a consumer buying a product housed in the container 61
20 that the product may have previously been tampered with. As
21 illustrated in Figs. 12, 14, and 15, the tamper evident
22 arrangement 92 is embodied as a spray actuator cover 93
23 which is molded integral with the structure 60. The cover
24 93 is connected to the upper wall 73 of the base ring 62 by
25 frangible ribs or tamper bars 94 extending between the cover
26 93 and a surface forming the opening 74. The ribs 94 must
27 be broken and the cover 93 removed to enable access to the
28 spray actuator 75. A legend should be printed on a label of
29 the container 61 or the cap 64 to alert the buyer to the
30 expected presence of the tamper evident cover 93. In order

1 to assure that the ribs 94 are not unintendedly broken
2 before the closure structure 60 is even placed on the
3 container 61, as by an automatic capping machine, the
4 structure 60 is provided with a peg or pin 95 extending from
5 the end wall 80 of the cap 64. As is illustrated in Fig.
6 14, the pin 95 contacts the cover 93 in the closed position
7 of the cap 64 and prevents movement between the cover 93 and
8 the base ring 62 which could break the ribs 94.

9 Figs. 16 and 17 illustrate a high profile key release
10 closure structure 100, which is substantially similar to the
11 structure 60. The principal difference is that a spray
12 actuator 101 is molded integral with a base ring 102 of the
13 structure 100. The actuator 101 is connected to the base
14 ring 102 by frangible ribs 103. The base ring 102 is
15 connected by an integral hinge 104 to a closure member or
16 cap 105. The cap 105 is retained in a closed position by a
17 latch mechanism 106, similar to the latch mechanism 66 of
18 the structure 60. The cap 105 is provided with a separation
19 prevention pin or peg 107 extending from an end wall 108 of
20 the cap 105 which engages the actuator 101 when the cap 105
21 is in its closed position to prevent the actuator 101 from
22 being unintentionally separated from the base ring 102, as
23 during capping of a container 109 by an automatic capping
24 machine to position the structure 100 on an aerosol container
25 109 and the actuator 101 on an aerosol valve stem 110. The
26 cap 105 includes a side wall in which is formed a key slot
27 111 similar to the key slot 88 of the structure 60 which is
28 employed in a similar manner thereto to release the latch
29 mechanism 106.

1 The spray actuator 101 integrally molded with the
2 closure structure 100 provides tamper evidence regarding any
3 product housed in a container 109 on which the structure 100
4 is affixed. In order to release a product within the
5 container 109, the actuator 101 must first be twisted to
6 break the ribs 103 to thereby free the actuator 101. A
7 prospective buyer of a product packaged in the container 109
8 may be alerted by a warning on the container 109 or cap 105
9 to inspect the ribs 103 for prior tampering before
10 purchasing the product. In most other respects, the closure
11 structure 100 is substantially similar to the structure 60.

12 It is to be understood that while certain forms of the
13 present invention have been illustrated and described
14 herein, it is not to be limited to the specific forms or
15 arrangement of parts described and shown.

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C L A I M S

What is claimed and desired to be secured by Letters Patent is as follows:

1. A captive key release closure structure for a container, said structure comprising:
 - (a) closure base means for connection to said container;
 - (b) a closure member having at least one open position and a closed position;
 - (c) hinge means connecting said closure member to said base means to enable pivoting said closure member between said closed position and said open position;
 - (d) cooperating latch means on said base means and said closure member to releasably retain said closure member in said closed position; said latch means including indentation means and pawl means aligned such that when said closure member is in the closed position thereof, said pawl means is interferingly received in said indentation means at a substantial angle relative to a direction of opening of said closure member from the closed position to an open position thereof, so that said pawl means must be forceably biased by a user from the indentation means in order to move the closure member to an open position thereof; and

- (e) key slot means formed on at least one of said closure member and said base means and positioned at an interface therebetween when said closure member is in said closed position, said key slot means being adapted to receive key means operable to pry said closure member away from said base means to thereby release said latch means and allow said pivoting of said closure member.
2. A structure as set forth in Claim 1 wherein:
- (a) said latch means is hidden from view within said structure when said closure member is in said closed position.
3. A structure as set forth in Claim 1 wherein said latch means includes:
- (a) base wall means extending circumferentially along at least a portion of and near a periphery of said base means;
 - (b) closure wall means extending circumferentially along at least a portion of and near a periphery of said closure member;
 - (c) said indentation means are formed in one of said wall means; and
 - (d) said pawl means are formed on the other of said wall means and, when in said closed position, said pawl means projects into said indentation means at an angle of approximately ninety degrees relative to the direction of opening of said closure member.

4. A structure as set forth in Claim 3 wherein:
 - (a) said base means includes a radially inwardly directed recess; and
 - (b) said key slot means is formed in said closure wall means at a position to align with said recess.

5. A structure as set forth in Claim 4 wherein said latch means includes:
 - (a) a pair of pawls formed on a radially inner surface of said closure wall means on opposite sides of said key slot means; and
 - (b) a pair of indentations formed on a radially outer surface of said base wall means and positioned to align respectively with said pawls, said indentations respectively receiving said pawls in said closed position of said closure member to thereby latch same in said closed position.

6. A structure as set forth in Claim 4 wherein said latch means includes:
- (a) said base wall means having a base surface, at least a portion of said base surface being frustoconical;
 - (b) said closure wall means having a closure surface, at least a portion of said closure surface being frustoconical; and
 - (c) said base surface and said closure surface being positioned and oriented whereby the respective frustoconical surfaces thereof engage in said closed position of said closure member to thereby latch same in said closed position.
7. A structure as set forth in Claim 1 wherein said latch means includes:
- (a) said pawl means projecting from said base means at a position substantially opposite said hinge means; and
 - (b) said indentation means formed on an inner surface of said closure wall means and positioned to engage said pawl means in said closed position of said closure member.

8. A captive key release closure structure for a container, said structure comprising:
- (a) a base ring for connection to said container having a central axis;
 - (b) a closure member having at least one open position and a closed position;
 - (c) hinge means connecting said closure member to said base ring to enable pivoting said closure member between said closed position and said open position;
 - (d) a base wall extending circumferentially along at least a portion of and near a periphery of said base ring;
 - (e) a closure wall means extending circumferentially along at least a portion of and near a periphery of said closure member;
 - (f) cooperating latch means on said base ring and said closure member to releasably retain said closure member in said closed position; said latch means including pawl means and catch means; said pawl means engaging said catch means at a substantial angle relative to said ring central axis such that said pawl means interferingly engages said catch means and must be forceably biased past said catch means by a user when moving said closure member from said closed position to an open position thereof; and

- (g) a key slot formed on at least one of said closure member and said base ring and positioned at an interface therebetween when said closure member is in said closed position, said key slot being adapted to receive key means operable to pry said closure member away from said base ring to thereby release said latch means and allow said pivoting of said closure member such that said closure member is child resistant when in the closed position thereof.
9. A structure as set forth in Claim 8 wherein:
- (a) said latch means is hidden from view within said structure when said closure member is in said closed position.
10. A structure as set forth in Claim 8 wherein said latch means includes:
- (a) said indentation means formed in said base wall;
and
 - (b) pawl means formed on said closure wall, said pawl means being positioned to engage said indentation means in said closed position of said closure member.
11. A structure as set forth in Claim 8 wherein:
- (a) said base ring includes a radially inwardly directed recess; and
 - (b) said key slot is formed in said closure wall at a position to align with said recess.

12. A structure as set forth in Claim 8 wherein said latch means includes:

- (a) a pair of pawls formed on a radially inner surface of said closure wall on opposite sides of said key slot; and
- (b) a pair of indentations formed on a radially outer surface of said base wall and positioned to align respectively with said pawls, said indentations respectively receiving said pawls in said closed position of said closure member to thereby latch same in said closed position.

13. A structure as set forth in Claim 8 wherein said latch means includes:

- (a) said base wall having a base surface, at least a portion of said base surface being frustoconical;
- (b) said closure wall having a closure surface, at least a portion of said closure surface being frustoconical; and
- (c) said base surface and said closure surface being positioned and oriented whereby the respective frustoconical surfaces thereof engage in said closed position of said closure member to thereby latch same in said closed position.

14. A structure as set forth in Claim 8 wherein:

- (a) said hinge means is integral with said base ring and said closure member.

15. A captive key release closure structure for an aerosol container having a neck rim and an aerosol actuator, said structure comprising:
- (a) a base ring sized for connection to said aerosol container by engaging said neck rim;
 - (b) a cap member having at least one open position and a closed position, said cap member being sized to fit over an aerosol actuator of said container;
 - (c) hinge means connecting said cap member to said base ring to enable pivoting said cap member between said closed position and said open position;
 - (d) a cap wall means extending circumferentially along at least a portion of and near a periphery of said cap member;
 - (e) cooperating latch means on said base ring and said cap member to releasably retain said cap member in said closed position; and
 - (f) a key slot formed on at least one of said cap member and said base ring and positioned at an interface therebetween when said cap member is in said closed position, said key slot being adapted to receive key means operable to pry said cap member away from said base ring to thereby release said latch means and allow said pivoting of said cap member.

16. A structure as set forth in Claim 15 and including:

- (a) separable tamper evident means integral with said base ring, said tamper evident means being adapted for separation from said ring by a user of a container having said structure connected thereto; and
- (b) separation prevention means positioned on said cap and engaging said tamper evident means in said closed position to prevent undesired separation of said tamper evident means from said ring upon connection of said structure to said container.

17. A structure as set forth in Claim 16 wherein said aerosol container includes an aerosol valve stem and requiring a spray actuator for cooperation with said stem, and wherein said tamper evident means includes:

- (a) a spray actuator frangibly integral with said base ring, said actuator being separated from said ring for use of said aerosol container, and separation of said actuator from said ring discovered by a purchaser of said container indicating previous tampering therewith.

18. A structure as set forth in Claim 16 wherein said tamper evident means includes:

- (a) a spray actuator cover frangibly integral with said base ring, said cover being separated from said ring for use of said aerosol container, and separation of said cover from said ring discovered by a purchaser of said container indicating previous tampering therewith.

19. A structure as set forth in Claim 16 wherein said separation prevention means includes:

- (a) a peg extending from said end wall of said cap, said peg engaging said tamper evident means in said closed position of said cap to prevent undesired separation of said tamper evident means from said base ring upon connection of said structure to said container.

20. A structure as set forth in Claim 15 wherein:

- (a) said hinge means is integral with said base ring and said cap member.

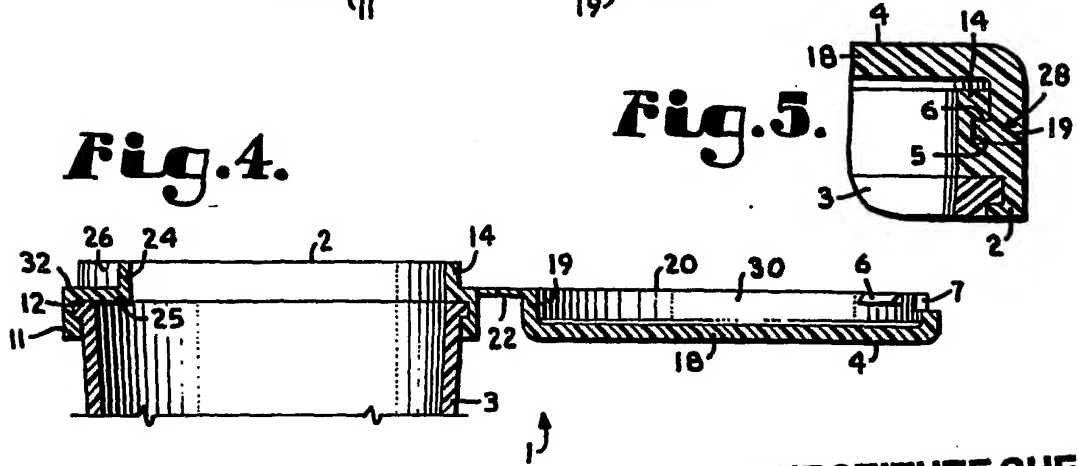
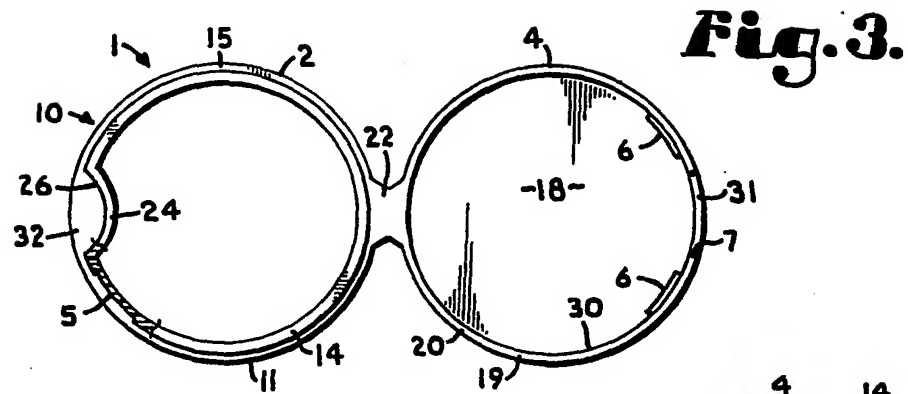
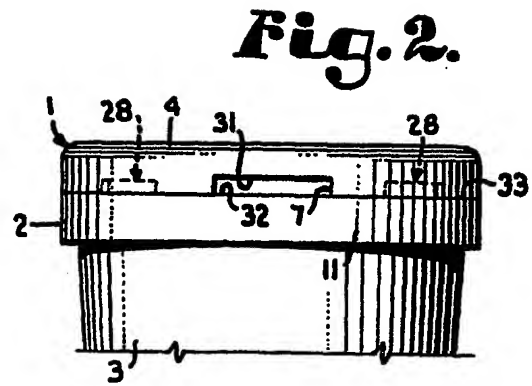
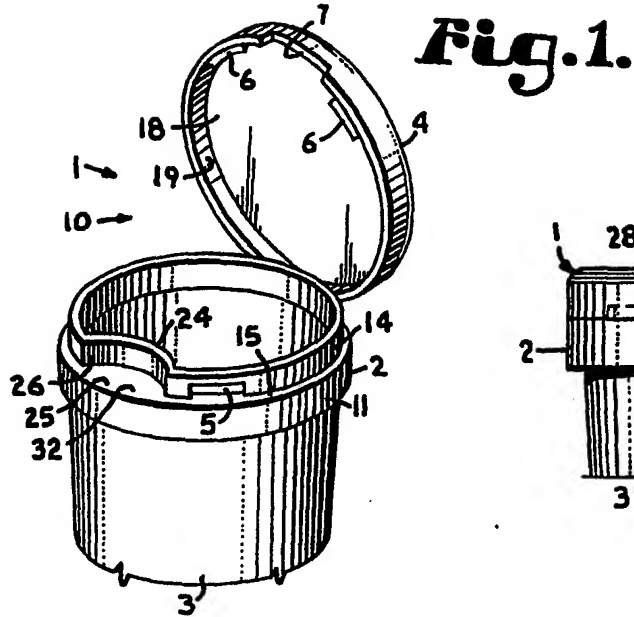


Fig. 6.

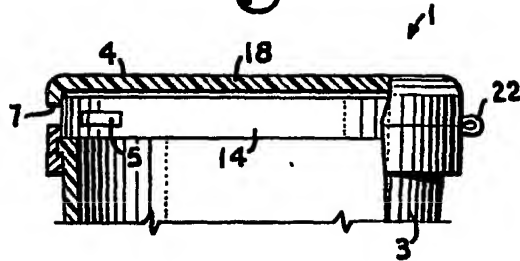


Fig. 7.

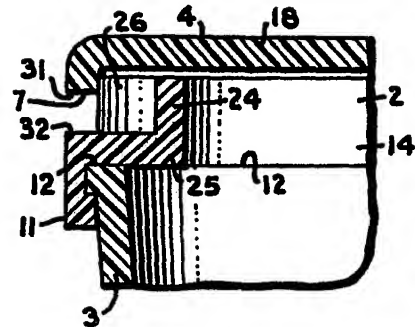


Fig. 8.

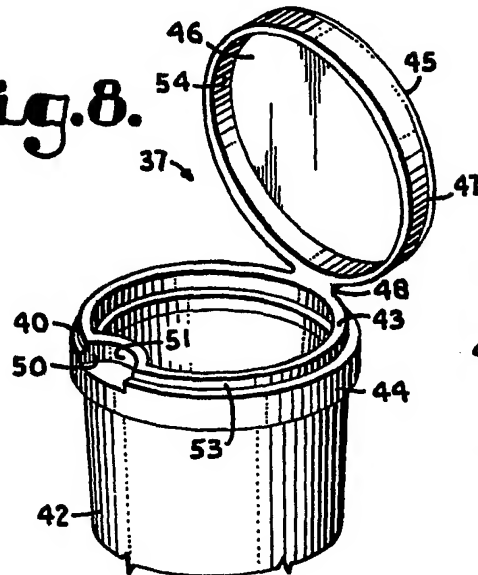


Fig. 9.

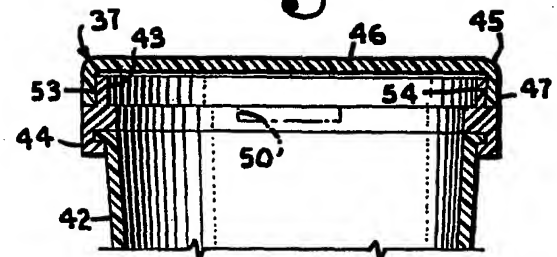


Fig. 10.

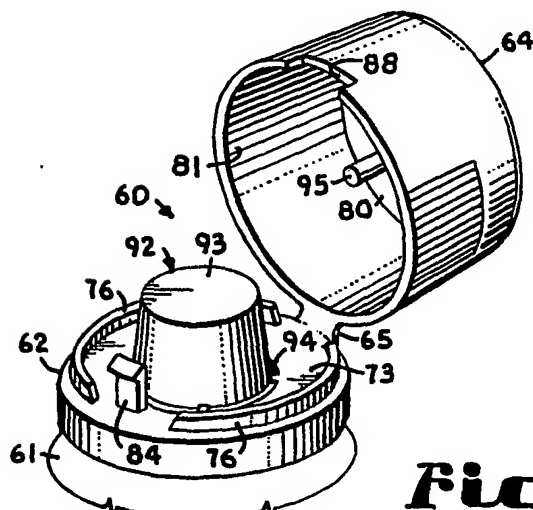
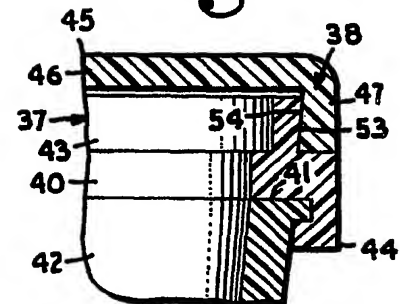


Fig. 11.

Fig. 12.

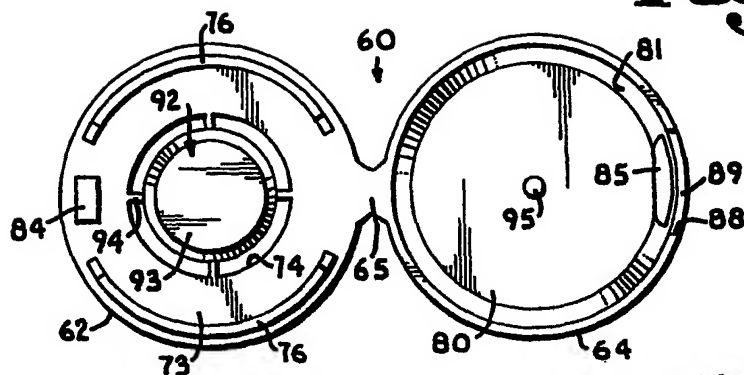


Fig. 14.

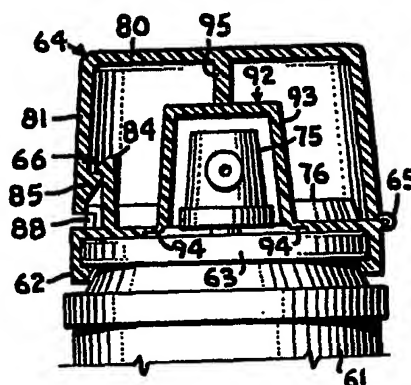


Fig. 13.

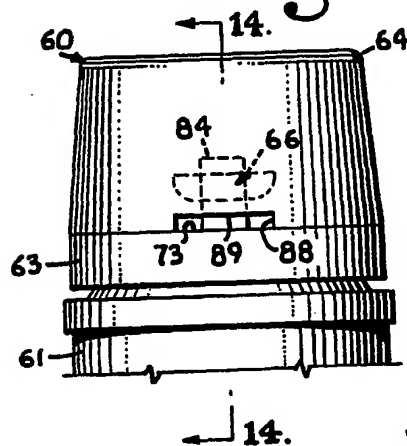


Fig. 15.

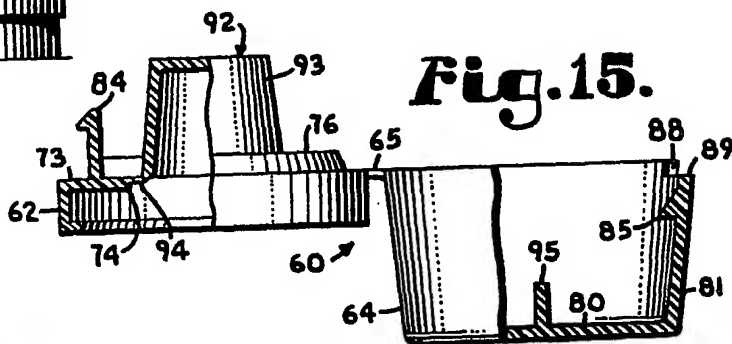


Fig. 16.

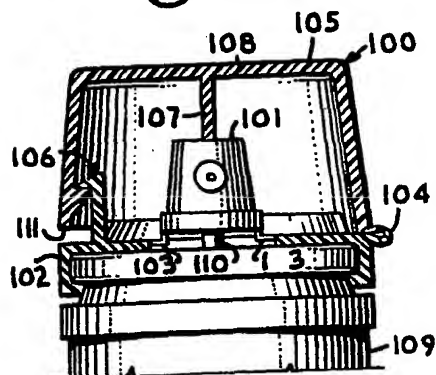
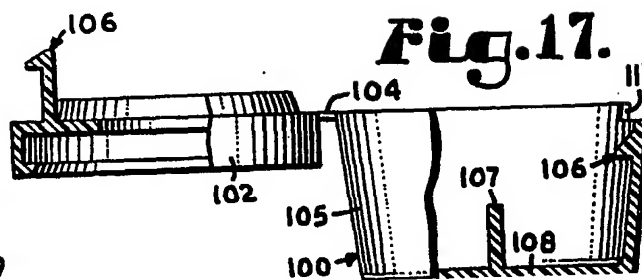
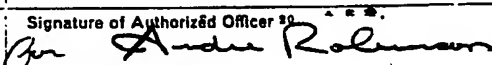


Fig.17.



INTERNATIONAL SEARCH REPORT

International Application No PCT/US90/04898

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ³		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC (5): B65D 43/16, 50/14		
U.S. CL: 215/215		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁴		
Classification System	Classification Symbols	
U.S.	215/215, 302; 220/284	
Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched ⁵		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴		
Category ⁶	Citation of Document, ¹⁵ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁴
A	US, A, 3,532,249 (GACH) 06 October 1970	
A	US, A, 3,721,361 (BARRY et al.) 20 March 1973	
A	US, A, 3,828,959 (LERNER) 13 August 1974	
A	US, A, 3,831,804 (FOCHT) 27 August 1974	
A	US, A, 4,278,178 (GEISER) 14 July 1981	
A	US, A, 4,393,976 (MAGUIRE) 19 July 1983	
A	US, A, 4,535,904 (O'CONNOR et al.) 20 August 1985	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>[*] Special categories of cited documents: ¹³</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search ²		Date of Mailing of this International Search Report ³
19 October 1990		31 JAN 1991
International Searching Authority ¹		Signature of Authorized Officer ¹⁰
ISA/US		 Stephen Garbe